Small Business Innovation Research/Small Business Tech Transfer

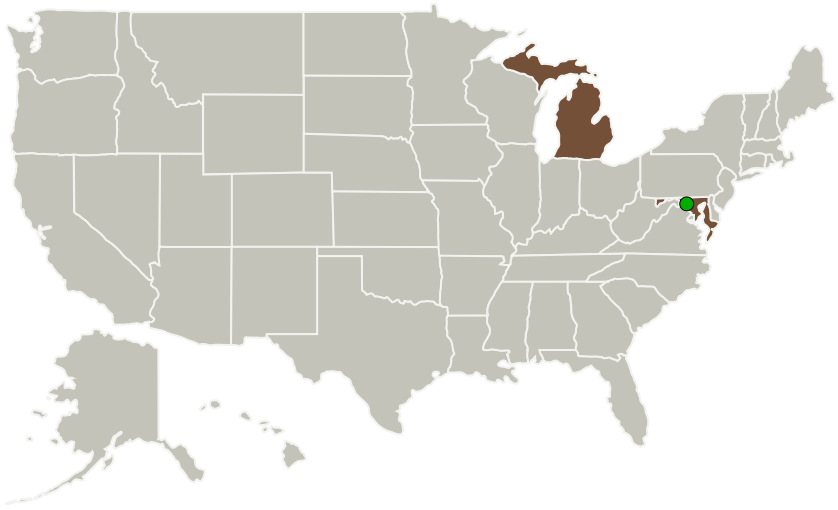
High-Resolution Silicon-based Particle Sensor with Integrated Amplification, Phase I

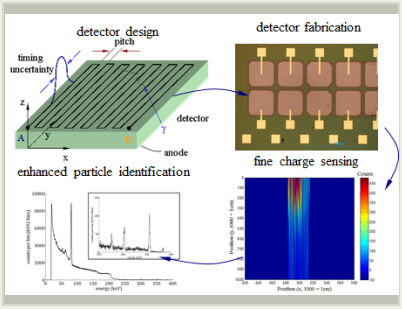
Completed Technology Project (2013 - 2013)

Project Introduction

This SBIR Phase I project will deliver a breakthrough in particle-detection sensors, by integrating an amplifying junction as part of the detector topology. Focusing on energetic particle detection in the heliosphere, the resulting leap in the resolution with which the deposited charge is measured results in far more precise energy and position measurements, from which the certainty in the particle identification is increased. Silicon is chosen as the material upon which the avalanche particle detector (APaD) will be developed because it possesses high stopping power for ions, low material cost, and an extensive microelectronic fabrication base. We have previously made both: a) low-noise silicon detectors for ion and high-energy sensing, and b) avalanche photodiodes (APDs) for optical photon sensing. The objective of the project is to integrate the two topologies so that we can compare the energy resolution with and without on-chip amplification across the energy range 10 keV – 3 MeV, with a goal of three times improvement in resolution at 80 keV.

Primary U.S. Work Locations and Key Partners





High-Resolution Silicon-based Particle Sensor with Integrated Amplification

Table of Contents

Project Introduction	1
Primary U.S. Work Locations and Key Partners	1
Project Transitions	2
Organizational Responsibility	2
Project Management	2
Technology Maturity (TRL)	2
Images	3
Technology Areas	3
Target Destinations	3

Small Business Innovation Research/Small Business Tech Transfer

High-Resolution Silicon-based Particle Sensor with Integrated Amplification, Phase I

Completed Technology Project (2013 - 2013)

Organizations Performing Work	Role	Type	Location
Svaati Scientific LLC	Lead Organization	Industry Minority-Owned Business, Small Disadvantaged Business (SDB), Women-Owned Small Business (WOSB)	Ann Arbor, Michigan
Goddard Space Flight Center(GSFC)	Supporting Organization	NASA Center	Greenbelt, Maryland

Primary U.S. Work Locations	
Maryland	Michigan

Project Transitions

May 2013: Project Start

November 2013: Closed out

Closeout Documentation:

- Final Summary Chart*(https://techport.nasa.gov/file/138546)*

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Svaati Scientific LLC

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

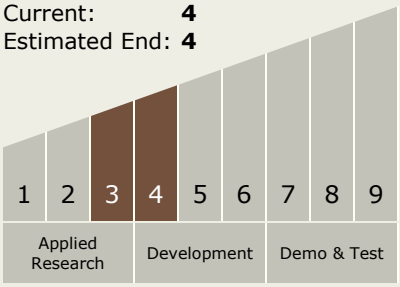
Carlos Torrez

Principal Investigator:

Subhashree Ramadoss

Technology Maturity (TRL)

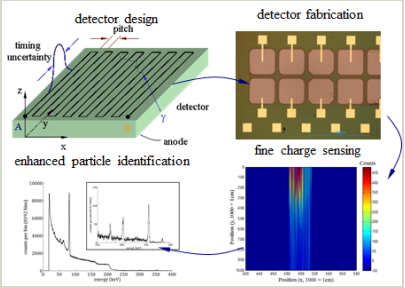
Start: **3**
Current: **4**
Estimated End: **4**



High-Resolution Silicon-based Particle Sensor with Integrated Amplification, Phase I

Completed Technology Project (2013 - 2013)

Images



Project Image
High-Resolution Silicon-based Particle Sensor with Integrated Amplification
(https://techport.nasa.gov/image/135320)

Technology Areas

Primary:

- TX08 Sensors and Instruments
  - TX08.3 In-Situ Instruments and Sensors
    - TX08.3.1 Field and Particle Detectors

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System